11. Union Conservation Unit

11.1. Introduction

The Union River enters Lynch Cove at the far end of the hook in south Hood Canal and is relatively far removed from the other known populations of summer chum. WDFW and PNPTT (2000) reports the results of genetic analysis show the Union River population is significantly different from the other populations. Also, the summer chum of Union River show earlier run timing, measured by appearance in spawner surveys, than summer chum of other streams in the region (WDFW and PNPTT 2000). For all these reasons, the Union River is categorized as a separate native summer chum stock.

According to Lestelle, et. al. (2005a), the Union population shows the least loss of performance of the eight summer chum salmon populations. WDFW and PNPTT (2000) further report that annual escapement estimates of 100 or fewer spawners during the 1970s. Since that time, the estimates have been considerably higher in most years. As of 2000, the Union River was the only non-supplemented summer chum population that has increased its returns since the 1970s. WDFW and PNPTT (2000) considered the Union River stock as 'healthy' and was eventually made part of the overall summer chum salmon supplementation program. The Union River supplementation program is now a cooperative effort between the Hood Canal Salmon Enhancement Group (HCSEG) and WDFW and was initiated in brood year 2000. The goal is to reintroduce and restore a healthy, natural, self-sustaining population of summer chum in the Tahuya River. The strategy is to boost the abundance of the Union River population to allow for transfers of surplus fish for a reintroduction of summer chum on the Tahuya River using that Union River stock (WDFW and PNPTT 2003).

Current habitat conditions and situations were assessed using a variety of sources. Several sources were used to assess the summer chum salmon stocks in the Eastern Strait of Juan de Fuca conservation unit. This Salmon Recovery Plan (SRP) will not repeat the details of these assessments, but instead refers the reader to the cited documents. All material and documents referenced in this SRP should be considered part of, and integral to, the recovery of summer chum salmon. These sources provided the primary reference and knowledge base for development of these aspects of the SRP. Details of the EDT assessments for the Eastern Strait of Juan de Fuca stocks, including a summary of the baseline performance measures, and a summary of strategic priorities, are provided in Lestelle et al, (2005a) (see Appendix A). The EDT Method is a widely used tool to help prioritize habitat restoration and protection measures for salmon populations. It provides a systematic way of diagnosing habitat conditions that have contributed to the current state of populations, and it enables an assessment of priorities for developing restoration and protection plans. It also provides an analytical procedure for assessing the potential benefits to salmon

populations of actions that might be taken to address habitat related issues impeding recovery. Other detailed assessments of habitat and environmental conditions are provided in the SCSCI (WDFW and PNPTT 2000), Correa (2003), Kuttel (2003) and May and Peterson (2003).

Although summer chum habitats in the Union River watershed have undergone changes from historic conditions, Lestelle, et. al. (2005a) believe they still provide relatively good nursery conditions for chum salmon fry. Extensive mudflat and wetlands exist at the mouth of the river. According to Lestelle, et. al. (2005a). the Union River population, produced in the southern terminus of Hood Canal, exhibits a pattern of spawner abundance distinctly different than the other seven populations. That pattern is its sudden and dramatic spawner abundance increase in the past several years. The pattern can be further characterized as:

- Low spawning escapements in the early years of the data record, at a time when escapements to the other rivers were large and when marine survival rates are believed to have been high and harvest rates on the other populations quite low;
- Spawning escapements tending to increase in the 1980s, then remaining relatively stable through the 1990s, with the notable exception of 1986 when it jumped markedly;
- Escapements beginning to increase again around the turn of the century and prior to the onset of returning hatchery fish, then jumping to record highs corresponding with the return of hatchery supplementation fish in 2003-04.

The dominant land use in the upper portions of the Union River, and its tributaries, is residential development, small farms, industrial forestry and water storage/diversion. The middle and lower reaches have moderately heavy residential development, as well as numerous small hobby farms and minor forestry operations. Belfair is located directly east of the river mouth and subestuary. Three County owned bridge crossings, and several privately owned bridges, exist. These prevent the river from migrating throughout its floodplain (WDFW and PNPTT 2000). The overall freshwater habitat is in fair condition, with the majority of the negative impacts occurring from encroachment by homes and farms in the floodplain. In addition, dikes and agricultural activities and modifications in the subestuary and intertidal areas are problems. The potential for further habitat degradation remains high due to the trends in growth, urban land use designations, and inadequate stream, riparian and shoreline protections.

11.2. Geographic Description & Human Population Distribution

The Union Conservation Unit includes the Union River and Tahuya River watersheds. Also included within this unit are the marine nearshore waters east of a line drawn from the town of Union near the mouth of the Skokomish River

north to Rendsland Creek. This conservation unit lies almost entirely within Mason County with small portions within Kitsap County. Figure 11.1 provides a map of the Union Conservation Unit. The Union River watershed covers an area of almost 24 square miles with 10 miles of mainstem length. The town of Belfair is located near the mouth of the Union River. Other human developments of significance in this conservation unit continue along the south and north shores of southern Hood Canal.

WDFW and PNPTT (2000) report that the Tahuya River is the largest stream draining the Kitsap Peninsula at 45.1 sq. miles. It is located east of Rendsland Creek and the Dewatto River, south of Big Beef Creek, and west of Big Mission Creek and the Union River. The headwaters are located in the Green Mountain on the plateau of the Kitsap peninsula and flow southwesterly, entering the east side of Hood Canal at the community of Tahuya. The Tahuya River has a total mainstem length of 21 miles and a combined tributary length of approximately 64.9 miles. Below Lake Tahuya, the Tahuya River flows through gently rolling hills with a low to moderate stream gradient. Below river mile (RM) 14, the river flows through a broad alluvial valley. A distinctive feature of the Tahuya River, and most of the streams draining the southwest Kitsap Peninsula, is the large wetland sections directly associated with the mainstem, as well as numerous tributary wetlands within the drainage. The geology of this watershed is dominated by glacial till. The moderate terrain and low elevation of the Tahuya River watershed results in a rain dominated hydrologic pattern where many of the smaller tributaries go dry early in the summer season, or during winter dry periods. The numerous wetlands within the watershed are critical to moderating peak winter flow and augmenting summer low flows (WDFW and PNPTT 2000).

Detailed descriptions of each of these watersheds can be found in SCSCI Appendix 3.6 (WDFW and PNPTT 2000) and the WRIA 14 North and 15 West habitat limiting factors report (Kuttel 2003).

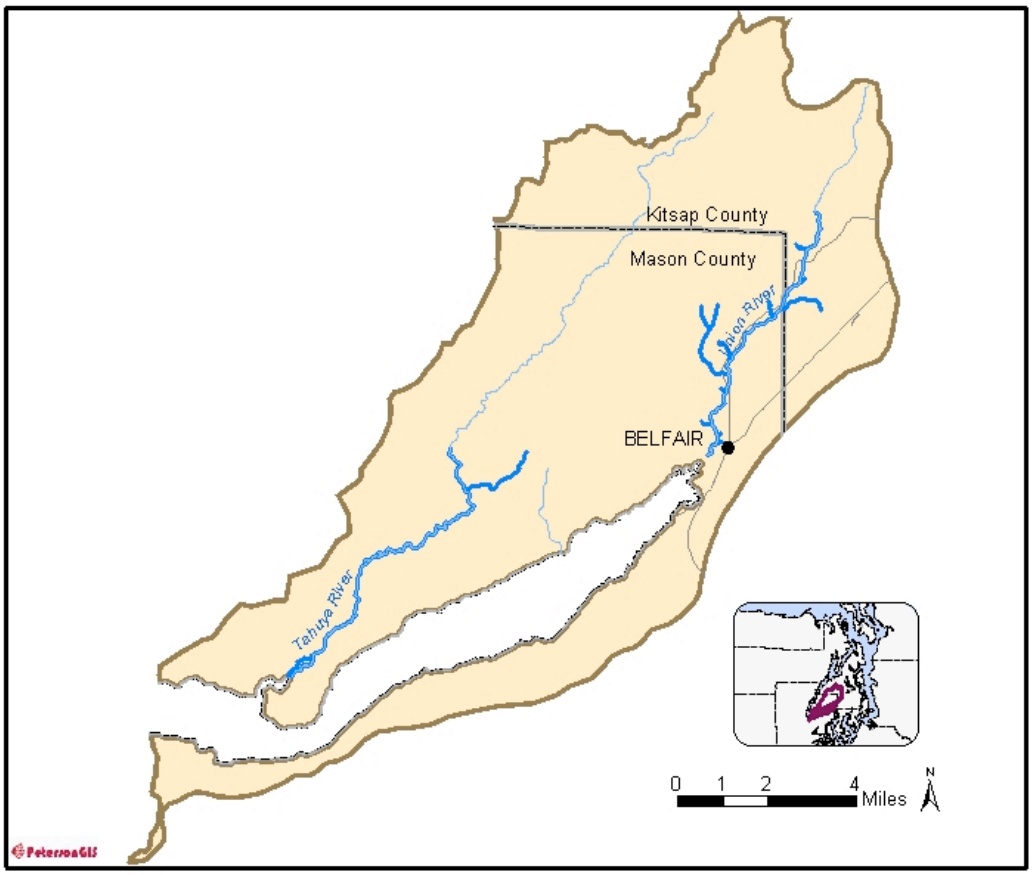

Figure 11.1. Union Conservation Unit (map produced by Gretchen Peterson, Peterson GIS).

11.3. Summer Chum Salmon Stocks' Description & Distribution

Several sources were used to assess the summer chum salmon stocks in the Union conservation unit. This SRP refers the reader to the appropriate documents cited in this section. All material and documents referenced in this SRP should be considered part of and integral to the recovery of summer chum salmon. The reader is urged to review the Summer Chum Salmon Conservation Initiative (SCSCI) (WDFW and PNPTT 2000) and subsequent supplemental reports. Summer chum salmon in Hood Canal and the Eastern Strait of Juan de Fuca were also assessed based on application of the Ecosystem Diagnostic and Treatment (EDT) Method (see Appendices A and B). The complete detailed EDT for summer chum salmon can be found at http://www.wa.gov/hccc/ and click on the Salmon Recovery Planning Activities link. On that page can be found links to various documents and the EDT web site for summer chum salmon. The web address for the EDT site:
www.mobrand.com/edt/sponsors/show_sponsor.jsp?sponsor_id=11

Naturally produced summer chum salmon originating from the Union Conservation Unit are likely from the Union River watershed (WDFW and PNPTT 2000). Summer chum spawn in the mainstem of the Union River is primarily limited to the first 2.5 miles of stream. Historical distribution is assumed to be as far as McKenna Falls (RM 6.7) under the historic flow regime. In the Tahuya River it is possible for summer chum to spawn as far up as RM 8.0, but surveys have only found the spawners as far as RM 3.0.

Current, historic and presumed summer chum salmon distribution in the Union Conservation Unit is shown in Figure 11.2.

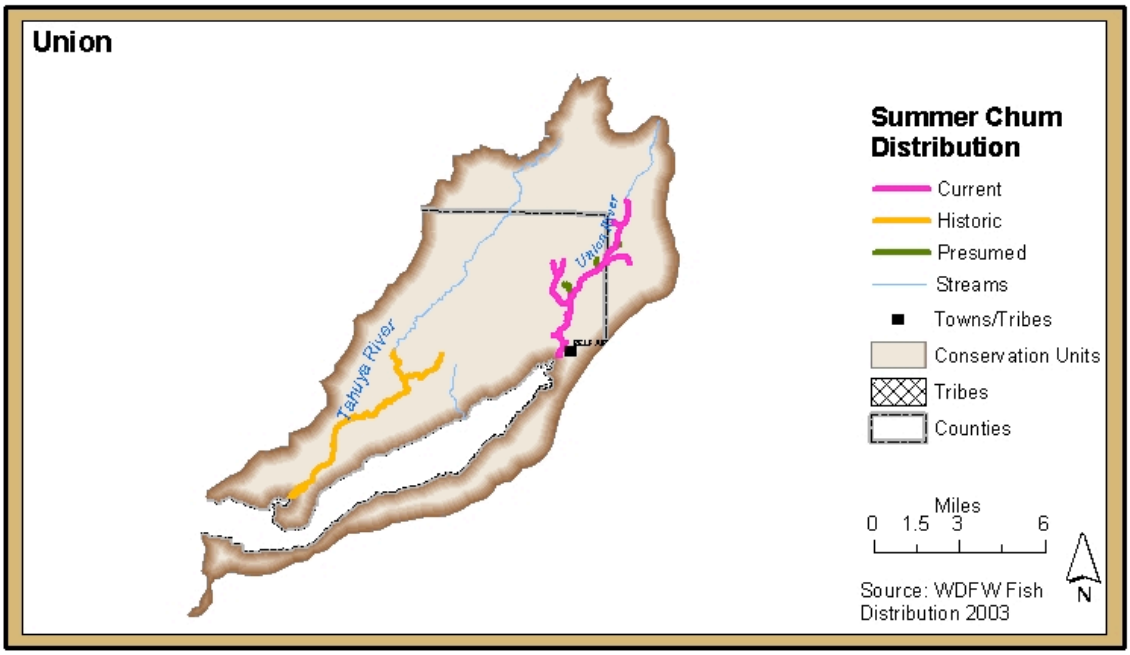

Figure 11.2. Map of the Union Conservation Unit showing current, historic and presumed summer chum salmon distribution.

Summer chum salmon produced from the Union River are part of the Hood Canal population targeted for recovery by the PSTRT. The Hood Canal population is one of two independent summer chum populations tentatively identified by the PSTRT (Currens 2004 Draft in progress). Currens (2004 Draft in progress) provides a detailed analysis of these conclusions and speculates on the importance of the historical geographic distribution of summer chum salmon habitat. He also speculates on the overall "isolation-by-distance relationship" that seems to be observed in the summer chum salmon aggregations. More analyses of population identification and viability are expected from the PSTRT. At this time it is not expected that this further analysis will affect the basic approach taken for recovery in this SRP.

PNPTT and WDFW (2003) have identified the stock that is naturally produced in the Union River to target for recovery in this conservation unit. The Union River

stock is one of the six stocks that comprise the PSTRT designated Hood Canal aggregation. The co-manager interim recovery goals for these stocks are presented in Table 11.1.

Table 11.1. Hood Canal aggregation: co-manager interim abundance and escapement recovery goals for the Union spawning aggregation.

Stocks	Abundance	Escapement
Union	550	340

PNPTT and WDFW (2003) also developed abundance and spawning escapement threshold criteria. One of the criterion for recovery is that a summer chum stock (Union) must, over a minimum of the recent twelve year period, have both a mean abundance and mean escapement of natural-origin recruits that meets or exceeds the defined thresholds. Table 11.2 provides a summary of escapement for the recent twelve year period, 1993-2004, for the Union spawning aggregation.

Table 11.2. Escapement threshold for the Union spawning aggregation based on PNPTT and WDFW (2003).

	ESCAPEMENT				
Population aggregation	**93-04 Average**	**target**	**% of target**	**# times below target 2001-2004 (≤1)**	**# times below target 1997-2004 (≤2)**
Union	2,000	340	588	0	2

The Union aggregation currently is meeting the escapement threshold as established by the co-managers. The recent years population abundance is likely a combination of both hatchery and natural-origin recruits and to meet the recovery goal 12-year criterion, only natural origin escapement must be counted. A cooperative supplementation project between the HCSEG and WDFW was initiated in 2000. The intent of the program is to boost the Union River stock to a level that can be used for the reintroduction of summer chum salmon into the Tahuya River. Broodstock from naturally produced Union stock is being used to rebuild summer chum salmon in the Union River and will be used for the Tahuya supplementation program. The Tahuya program was begum in 2004. Interim recovery goals have not been established for the Tahuya stock.

Additional co-manager criteria require that the stocks do not fall below the target in more than once in the recent four-year period and no more than twice in the recent eight-year period. Again, the Union aggregation meets the threshold for the recent four-year period and for the recent eight-year period though hatchery origin fish are part of the recent escapements. It should also be noted that criteria for productivity (for example, eight year average equal to or greater than 1.6 recruits per spawner) must be met for recovery. Data currently are insufficient to assess the productivity criteria but are being collected (PNPTT and WDFW 2003).

Summer chum salmon escapement (number of adults returning to spawn) for the Union River from the years 1974-2003 is presented in Figure 11.3.

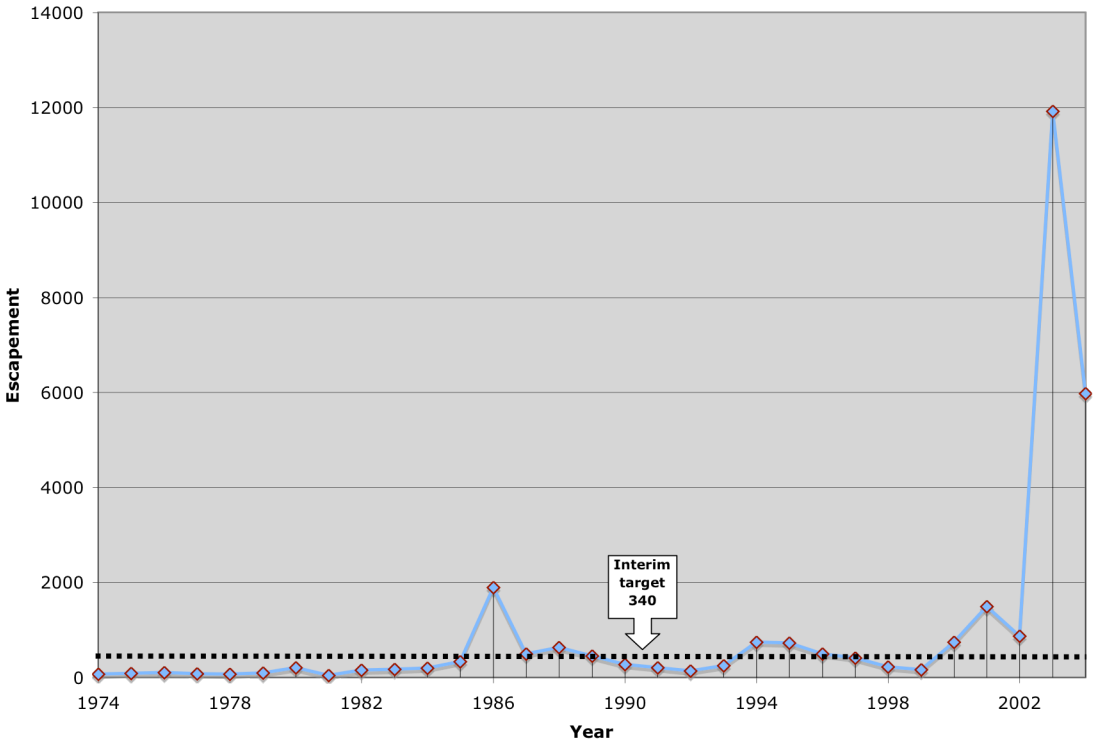

Figure 11.3. 1974-2003 summer chum salmon escapement for the Union River (data source: WDFW and PNPTT 2003, 2004, and 2005)

The co-managers have assessed the extinction risk faced by individual summer chum salmon stocks based on the methodology offered by Allendorf et al. (1997) and discussed in detail in section 1.7.4 of the SCSCI (WDFW and PNPTT 2000). The extinction risk was assessed again in 2003 based on data available through 2002 (WDFW and PNPTT 2003). The most recent assessment of extinction risk from the co-managers for the Union stock states, "Estimated escapements to the Union River show no declining trend over the period of record and, in fact, appear to have increased somewhat since the 1970s. Escapements over the last four years have ranged from 159 to 1,491, averaging 817 spawners. This stock has shown a recent increasing escapement trend, and its risk of extinction is now rated as low."[48]

[48] This assessment has just been updated by the co-managers and includes the years 2003 and 2004 (WDFW and PNPTT In preparation). The update indicates no change in the rating of low extinction risk.

11.4. Habitat overview & environmental conditions

Details of the EDT assessments for the Union stock, including a summary of the baseline performance measures and a summary of strategic priorities are provided in Lestelle, et. al. 2005a (see Appendix A). The EDT Method is a widely used tool to help prioritize habitat restoration and protection measures for salmon populations. It provides a systematic way of diagnosing habitat conditions that have contributed to the current state of populations, and it enables an assessment of priorities for developing restoration and protection plans. It also provides an analytical procedure for assessing the potential benefits to salmon populations of actions that might be taken to address habitat related issues impeding recovery. Other detailed assessments of habitat and environmental conditions are provided in the SCSCI (WDFW and PNPTT 2000), and Kuttel (2003).

11.4.1. Factors contributing to the decline of summer chum salmon

Lestelle, et. al. (2005a) conclude that, "[T]he Union population appears have relatively high productivity under both unfavorable and favorable ocean survival conditions and shows the least loss in performance of the eight populations."

In, summary the EDT conclusions for the Union (Lestelle, et. al. 2005a) are that:

- The amount of potential increase in population abundance is approximately equal between the Union River (freshwater), the natal subestuary, and the estuarine-marine waters beyond, if each area was able to be fully restored. Potential gain in productivity is highest for freshwater, followed by estuarine-marine waters.

- Protection of freshwater reaches shows the highest priority, followed closely by the natal subestuary.

- Potential benefits of restoring estuarine-marine areas are diffused over many segments but the Skokomish west shore is ranked highest among these areas, tied with the Oak Bay segment. The reason for the high value of the Skokomish west shore is due to its amount of change that has occurred in conjunction with its proximity to the Union River. The reason for the high value of the Oak Bay segment is less clear. We believe this to be partly the result of how we expect migration to proceed as fish from both shores of Hood Canal to be concentrated on the west side of Admiralty inlet as they move to the Strait. The importance of the Oak Bay area is also partly due to the increasing amount of competition with hatchery fish as summer chum move through Admiralty Inlet (picking up fish from other areas in Puget Sound).

- Within freshwater, sediment load and habitat diversity are seen as the most important factors to restore.

- Within the natal subestuary, several factors appear to be equally important for restoration, along with the amount of area available to be used for rearing.

- Within the estuarine-marine environment, the most important factor for restoration is food, associated with loss of eelgrass, revetments, and loss of riparian corridors.

May and Peterson (2002) rated floodplain conditions for the lower mile of the Union River as “fair” (25 to 50% lost connectivity and habitat) and “good” (≤ 25% lost connectivity and habitat) on the remainder of the mainstem. Fine sediment was rated “good” with a measure of 10% to 15% fines in the lower mainstem (May and Peterson 2002).

The SCSCI (WDFW and PNPTT 2000), the “Salmonid Habitat Limiting Factors Water resource Inventory Areas 15 (West), Kitsap Basin and 14 (North), Kennedy-Goldsborough Basin” prepared by the Washington Conservation Commission (Kuttel 2003), and May and Peterson (2002) provide details of the various habitat factors and environmental conditions affecting summer chum salmon in this conservation unit. In general, the findings from these reports are corroborated by the EDT assessment (Appendix A). These factors and conditions are summarized for the Union River (Table 11.3) and Tahuya River (Table 11.4) below.

Table 11.3 Union River

Factors for decline	Life stage most affected	Remarks
Loss of channel complexity (LWD, channel condition, loss of side channel, channel instability)	Spawning and incubation	The Union River still possesses a structurally diverse channel network with 63% pools. However pool frequency is poor at 5.9 channel widths between each pool. The stream contains low levels of large size LWD due to past stream clean-outs, riparian forest harvesting and natural transport downstream. Habitat surveys in 1993 found the Union River averaged 0.22 pieces of LWD/m from the mouth to McKenna Falls with nearly 42% of the wood being in the small size class [10-20 cm diameter]. The low levels of large size instream LWD may result in redd scour and channel instability. Much of the current instream LWD is western red cedar, which has long instream residency times due to its slow rate of decay. Stream clean-outs of LWD, particularly log jams and channelizations have been recorded back to the late 1800s but were more extensive during the late 1960s. For instance, in 1967 the WDF stream improvement division noted that five log jams were removed from the Union River and it was channelized for 5 miles. In a three year period in the late 1960s, numerous log jams were removed from the Union River and 2 of the larger tributaries, Courtney Creek and Bear Creek. In addition, rip rap was placed along 2 miles of Courtney Creek in 2 consecutive years in 1967 and 1968 and the lower two miles of Courtney Creek appears to have been moved sometime in the distant past.

Riparian degradation	Spawning and incubation	Most of the basin was completely logged of the original forests by the 1930s. Numerous farms, residential developments and associated bank armoring exist in the riparian corridor affecting the functional status of the riparian forest. Currently fifty two percent of the riparian area is forested of which 96% is dominated by deciduous trees. Sixty two percent of the total riparian length is sparsely vegetated or less than 66 feet wide. Rural residential development, agriculture, and roads cover 46% of the riparian area.
Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)	Juvenile rearing and migration	• For it's comparatively small size of 344.6 acres (6.1 miles perimeter), the estuarine delta of the Union River has been extensively diked and the tidal floodplain constrained as a result. Seven diked areas occupy 78.6 acres or 22.8% of the original summer chum rearing and migration habitat area. Some of these diked areas may be breached and now inundated by the tide but the extent of restoration to tidal circulation and the state of recovery cannot be verified without ground truthing. Several tidegates have been identified but their condition and impact on summer chum estuarine habitat is unknown (M. Schirato, WDFW, Olympia, WA pers. comm., Oct. 1995). Juvenile summer chum rearing opportunities are presently limited compared to the historic state of the subestuary. In particular, habitat extent and quality in the mesohaline reaches of the subestuary, which chum fry may volitionally occupy for up to 1-2 weeks, are very limited due to the diking. Much of the breaching of marshes appears to be in an early state of restoration. Fills for commercial or residential use include two areas totaling 3.6 acres, approximately 8.9% of the historical delta area. At least one of these fills is located on the outer edge of the historic

		subestuary, thus imposing an intertidal barrier to migrating summer chum fry. One small (0.9 acres) pond or other excavation is evident within the delta but its impact is thought to be minor. • Although much of the historically diked delta habitat in the Union River subestuary is now exposed to renewed tidal inundation, the associated ditching that accompanied diking and agricultural activities have heavily modified emergent marsh and other intertidal habitats. While these ditches and remnant dikes may not impose a direct impact, they likely inhibit restoration of natural drainage channel systems and delay long-term recovery of estuarine rearing habitat for summer chum. At least 19 ditch and remnant dikes are present, and extend over approximately 2 miles of delta habitat. Many of these are concentrated in a large dike-breach marsh in the lower extent of the delta, where chum fry would be expected to "stage" for migration into the Canal. Such ditching typically prevents or delays the formation of natural dendritic tidal channel systems, which in turn impacts foraging opportunities for juvenile salmon in the marshes. In addition, prey resources of the emergent marshes, which can be important to chum fry early in the estuarine migration, are likely progressing at a slower recovery rate than natural because of the ditching.

Table 11.4. Tahuya River

Factors for decline	Life stage most affected	Remarks
Loss of channel complexity (LWD, channel condition, loss of side channel, channel instability)	Spawning and incubation	Road building, diking, channelization, floodplain agriculture and residences, and bank armoring have constricted the floodplain and limited channel movement and the creation of new habitat. Agriculture land use found on the floodplain at RM 0.5 to 0.8 and RM 1.1 to 1.3 has eliminated or limited riparian forest development. From RM 1.6 to 2.0, a farm is located on a floodplain island bounded by the mainstem and a side-channel of the river. A roughly 800 foot long dike protects this site. Residential development at RM 2.5 to 2.7 is located in the floodplain on the west side of the river. Residential development at RM 4.5 to 6.0 is located in the floodplain on the north side of the river. Agriculture and residential developments also occur from RM 6.0 to 6.2. From RM 6.3 to 6.9 homes are placed directly on the river bank, and agricultural developments is cutting off old river meanders. Fill is used to protect residential development at RM 7.3 to 7.6. The residential and agricultural development in the floodplain and riparian forest of the river has resulted in the removal of riparian vegetation and bank armoring from river mile 7.5 downstream. From 1955 to 1970, the Washington Department of Fisheries Stream Improvement Division removed what was considered at that time as blockages to upstream salmon migration. Logjams, debris, and beaver dams were removed and many miles of mainstem and tributaries were channelized. The result was a loss of channel complexity and bed stability. From habitat survey data, the Tahuya River has 72% pools, 0.15 pieces of LWD/meter, and an average of 2.4 channel widths between each pool. This is a low impact for percent pool, a high impact for LWD and a moderate impact for pool spacing. The low density of LWD has not translated into a low percent pools,

		since LWD is not the only pool forming factor in low gradient, wetland dominated, channels such as the Tahuya. The combined ratings for channel complexity are rated as moderate, however conditions may decline for the next 50 to 100 years until the existing riparian forest matures and contributes increased LWD to the stream channel.
Riparian degradation	Spawning and incubation	By 1930 most of the old growth in the Tahuya River watershed had been harvested. Historical riparian forests were dominated by a mixture of old growth western red cedar, Douglas-fir, western hemlock, and areas of younger alder. Stumps remaining in the riparian forest adjacent to the stream channel network show that in most areas all the large conifer trees available for recruitment into the stream channel were removed with timber harvest. Presently, 7% of the riparian zone (by stream length) has no buffer, 24% averages <12 in. dbh and, 69% is 12 to 20 inches dbh (12-20 in dbh). Species composition of riparian forest is 52% deciduous dominated, and 37% mixed conifer and deciduous. Forty four percent of the riparian forest is greater than 132 feet in width, 27% 66 to 132 feet in width, and 29% less than 66 feet in width and/or sparsely vegetated. Riparian land use within the riparian buffer is 71% forested, 12% rural residential and 8% agriculture. Although 44% of the riparian forest greater than 132 feet in width and 71% of the riparian buffer forested, the small size of most of the trees and lack of conifer in the riparian forest combine for a moderate impact. The habitat is in recovery, however development of this watershed is expected to rapidly increase over the coming decades. Habitat surveys (between RM 4.0 and 9.0) of the Tahuya mainstem show low numbers of LWD at 0.15 pcs/m of channel length. Levels of LWD will continue to decline for the next 25 to 50 years until the existing riparian forest to matures and contributes large diameter LWD to the stream channel.

Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)	Juvenile rearing and migration	• Nearshore development including, bulkheads, filling of near shore areas, erosion onto beaches, installation of docks, and loss of shoreline vegetation, has reduced and eliminated nearshore habitat. Bulkheads increase the rate of beach erosion, modifying and eliminating suitable habitat. Bulkheads and docks force fish into deeper water where they are subjected to increased predation by birds and other fish species. Installation of bulkheads reduces available habitat for chum prey. Bulkheads and filling of nearshore habitat eliminates eelgrass beds and salt marsh, important rearing and feeding habitats. Removal of shoreline vegetation reduces shade, shoreline LWD, and increases erosion onto beaches, all important factors in the survival of summer chum and their prey. Shoreline vegetation is also an important source of terrestrial chum prey. Dock installation through filling, shading, and physical disturbance of the beach eliminates eelgrass beds, micro and macro algae, disrupts salmon migration, increases predation by forcing salmon into deep water, displaces prey species, and disrupts beach spawning of prey species. • Two areas of the delta, totaling >0.01 km (~1 ac; 1.4% of historical delta area), appear to have been filled, primarily for residential development. Three areas of roads or causeways have impacted the delta over 0.27 km (0.17 mi) and, in addition to the habitat directly lost in the footprint of the causeways, the effect of this has been to constrict estuarine exchange in the middle of the delta. For example, a bridge at RM 0.0 with a fill causeway, constricts the migration, development, and flushing of estuarine sloughs. The extent of change in tidal

		flooding circulation and the effect on migrating and rearing salmon is unknown.
Water quality, temperature	Adult spawning	High water temperatures into late September can negatively affect summer chum by preventing the entry of adults into the river, exposing them to predation. Temperature data shows that on some years water temperatures are 12 degrees Celsius or higher through the first half of September. Reductions in the extent of riparian forests, and the size of trees within the riparian forest increase stream temperatures through a loss of shade and transpiration. Within the lower 9 miles of the Tahuya River 29% of the riparian forest is less than 66 feet in width or sparsely vegetated.

11.4.2. Human development and land use

Population density in the Union Conservation Unit is relatively low, except in the area of Belfair, and portions of the Union River watershed and along the north and south shorelines. Figure 11.4 Presents population density for the Union conservation unit.

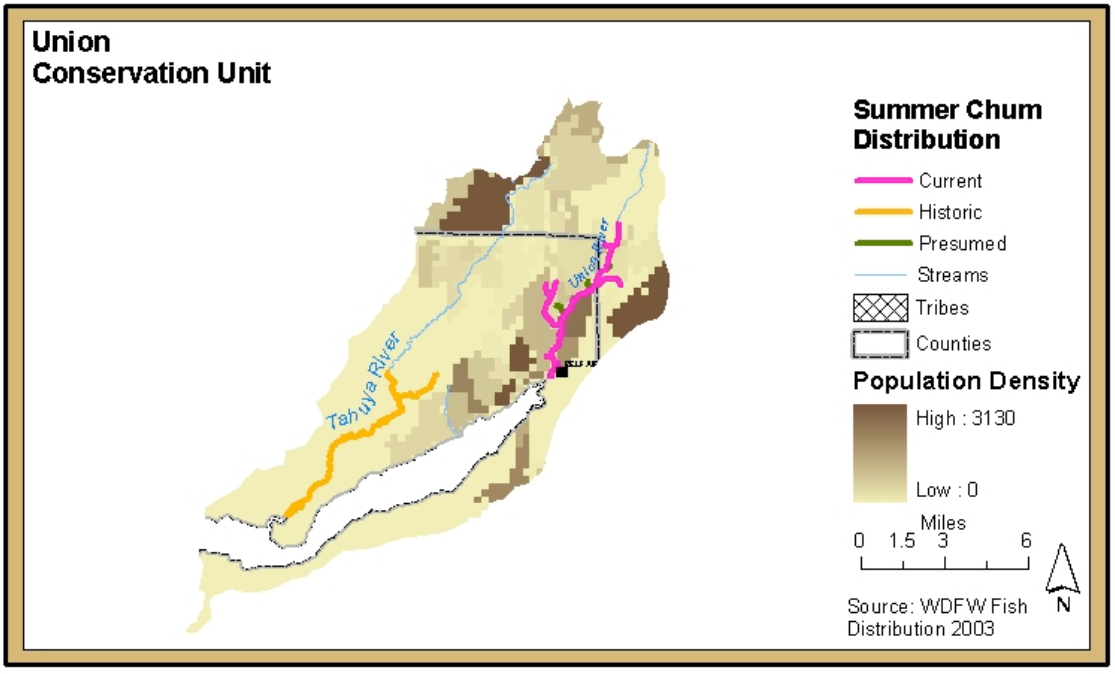

Figure 11.4. Human population density (people per square mile) for the Union Conservation Unit (map produced by Gretchen Peterson, Peterson GIS).

WDFW and PNPTT (2000) report that the Union River enters Lynch Cove in the eastern arm of Hood Canal**.** The watershed area is approximately 24 square miles with 10 miles of mainstem and 30 miles of tributary streams. The headwaters are in the Blue Hills near 1,500 ft. elevation. They flow through an undeveloped watershed before entering the Union River Reservoir that was constructed in 1955-57 as a municipal and industrial water supply. The project provides up to 5 million gallons per day for the City of Bremerton and the Puget Sound Naval Shipyard. The upper watershed contains moderate to steep side-slopes with a relatively low gradient stream channel downstream to McKenna Falls. That falls is located at river mile (RM) 6.7, immediately below the water supply dam (Cascade Dam) and reservoir. Below the falls, the gradient is also low, with the lower 5 miles being quite flat and flowing through a broad shrub-scrub floodplain. The Union River enters a subestuarine delta that has been heavily constrained by diking and filling, mainly for agriculture, flood control, and to protect residences located in the subestuary.

Mason County Development Regulations, dated January 18, 2005 have designated the lands in the lower watershed as part of the Belfair Urban Growth Area (UGA). UGAs have urban characteristics, but they currently lie outside of incorporated cities. In recognition of the availability of urban services and the proximity to urban areas, these areas are designated to accommodate the majority of the growth that is expected to occur within the County in the foreseeable future. The widest variety of uses, and the highest densities, will be allowed in Urban Growth Areas (Mason County Development Regulations section 1.02.020). The Belfair UGA is a ‘stand-alone’ area not affiliated with any incorporated city. Development regulations for this area are intended to accommodate existing land use patterns and densities, while planning for future growth. Mason County is in the process of developing a stormwater management plan for this UGA in conjunction with State Route 3 road improvements. The rest of the lower watershed is designated as Agricultural lands (at the mouth of the Union River) and Rural Residential (RR5-one dwelling unit per 5 acres and RR10-one dwelling unit per 10 acres).

Figure 11.5 presents the Union River watershed.

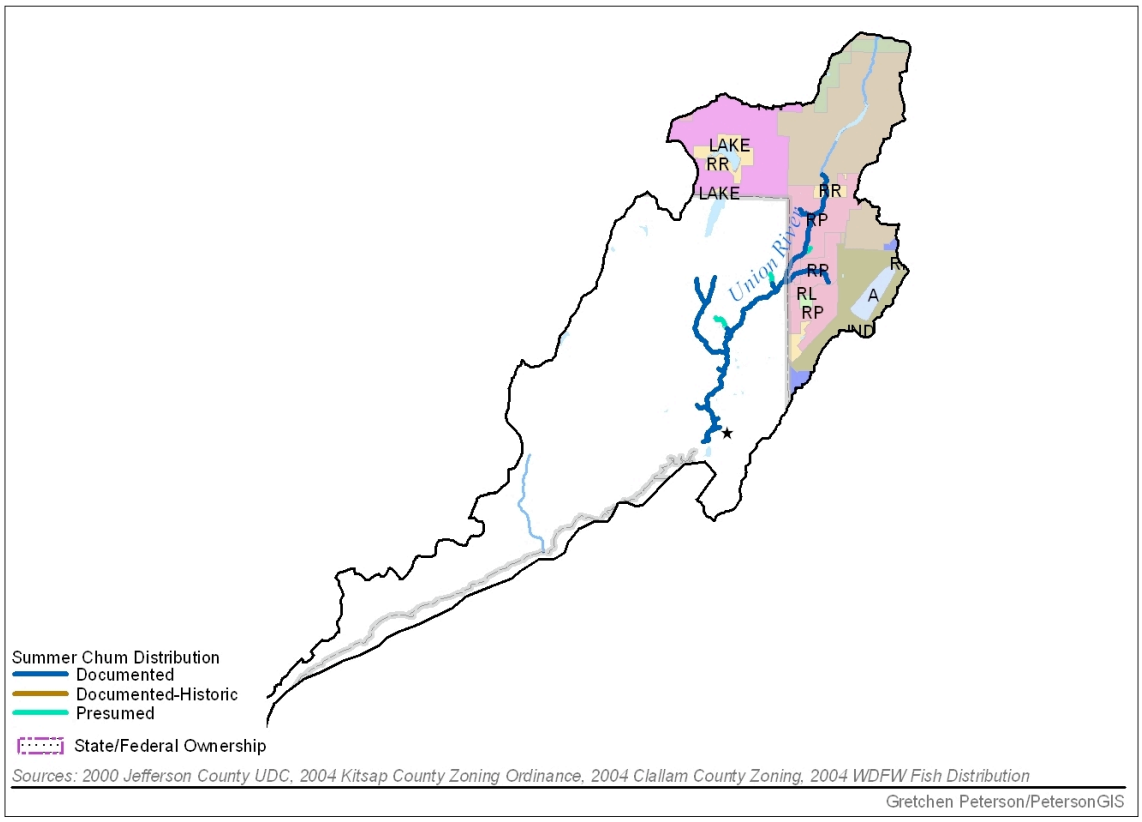

Figure 11.5. Land use in the Union River watershed. Note that the Mason County Development Areas Map is in progress. When completed the appropriate land use designations will be added to this map.

Zoning for this area is in development as part of Mason County's update of their comprehensive plan and critical areas ordinance under GMA provisions. The zoning shown in the upper watershed is from Kitsap County, which has designated these lands as rural lands per their Kitsap County Zoning Ordinance, 2004.

The primary historical land use in this watershed was timber harvest. A large portion of the watershed is still managed for timber in the Washington Department of Natural Resources, Tahuya State Forest, and on the lands of private timber companies. Seventy one percent of the riparian zone is fully forested, with another 6% clearcut. Agriculture accounts for 8% of the riparian zone, mainly in the form of Christmas tree farms and other small farms. Residential neighborhoods, within the 100-year floodplain, account for another 12% of the riparian zone. The immediate shoreline of Hood Canal is intensely developed. Many of the natural lakes, reservoirs, and wetlands in the Tahuya drainage are also intensely developed.

The lower Tahuya River watershed is designated by Mason County Development regulations as a mixture of Rural Residential (RR5, RR10 and RR20-one dwelling unit per 20 acres). Figure 11.6 shows some of the land use designations for the Tahuya watershed.

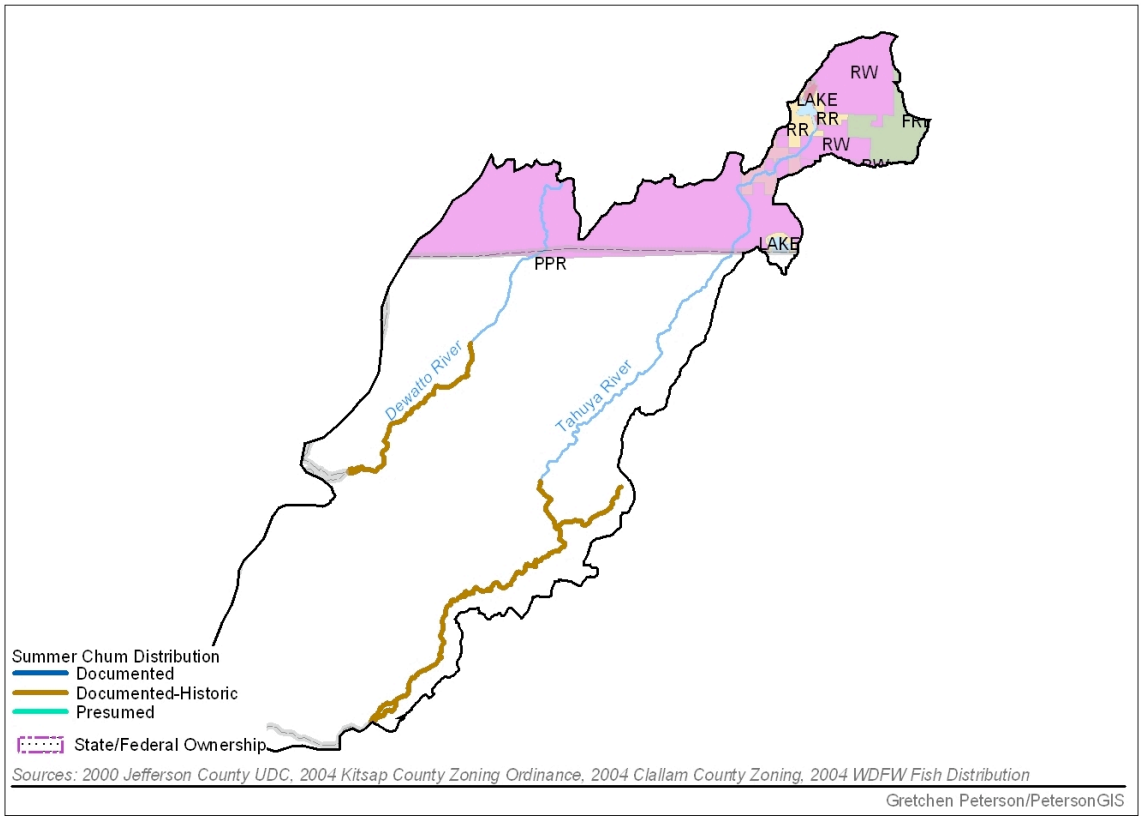

Figure 11.6. Land use in the Tahuya River watershed. Note that the Mason County Development Areas Map is in progress. When completed the appropriate land use designations will be added to this map.

Zoning for this area is in development as part of Mason County's update of their comprehensive plan and critical areas ordinance under GMA provisions. The zoning shown in the upper watershed is from Kitsap County, which has designated these lands as rural lands per their Kitsap County Zoning Ordinance, 2004.

11.5. Specific action recommendations

Section 11.5 presents specific recovery action recommendations for the Union conservation unit. Recommended actions are categorized as either Programmatic (section 11.5.1) or Project (section 9.5.2). Actions identified will be further delineated as actions to benefit the targeted Union spawning aggregation. Specific action recommendations are summarized and analyzed in the context of overall ESU-wide recovery (see section 13). All actions (previously

implemented, on-going, and proposed) would become part of the Monitoring and Adaptive Management Program for the SRP as described in section 14.

11.5.1. Programmatic recommendations

Programmatic recovery actions are those that are part of a policy, program, or process. They are generally of a regulatory or planning process nature. Programmatic actions could be part of a County's land use and regulatory program and structures or watershed planning processes. Comprehensive plans, critical areas ordinances, shoreline management master programs, and zoning could all be considered programmatic actions in this context. Programmatic actions are non-project (i.e., habitat restoration projects--LWD placement, culvert repairs, etc.) in nature. Programmatic actions, however, can include projects when such projects are descriptive of a comprehensive or encompassing process (i.e., levee removal or set back as part of an estuary restoration plan). Watershed management plans often include projects to address identified factors of decline or specific habitat conditions. For the purposes of this SRP, the management plans or planning processes will be considered programmatic actions whereas the projects identified within the management plans will be categorized as projects.

To most effectively address those factors that are likely affecting the performance of the spawning aggregations in this conservation unit, the SRP recommends the following programmatic actions summarized in Table 11.5.

Table 11.5. SRP recommended programmatic actions for the Union spawning aggregation in the Union conservation unit.

Recommended Programmatic Actions	Actions involved	Limiting factors to address
Mason County zoning and comprehensive plan/CAO updates	-support the update of Mason County CAO as per GMA requirements and development of the comprehensive plan -monitor long-term effectiveness of the zoning code and enforcement	-poor riparian condition -loss of channel complexity (LWD, channel condition, loss of side channel, channel instability)
Stormwater management planning for Belfair area and Highway SR3 improvements	-support the efforts of Mason County to develop stormwater management practices and facilities.	-water quality and stream flow -see SRP section 13
Union River/Tahuya River Summer Chum Salmon Supplementation Project	-continue the supplementation project to ensure appropriate and properly funding monitoring occurs. -see section 14 of this SRP	-see WDFW and PNPTT (2000) and (2003a) for complete details of this project, also section 5 of this SRP

State forest lands (Tahuya watershed)	-continue to preserve these lands in current ownership -Forest Service road maintenance and road abandonment plans should be implemented including appropriate resources to effectively complete the projects	-sediment aggradation
Community Nearshore Restoration Program	-continue to pursue application and implementation of the Community Nearshore Restoration program (see section 13)	-estuarine and nearshore habitat loss and degradation

11.5.2. Project recommendations

Project recovery actions are generally physical modifications to the landscape designed to address specific habitat situations in specific and limited geographic areas. Projects in the summer chum salmon ESU have been in process for many years by a variety of groups and entities. Section 11.5.2.1 provides an overview of existing projects relative to summer chum salmon recovery planning. Many of the project recommendations presented in this SRP are from the HCCC Lead Entity strategy (HCCC 2004). This SRP is designed to coordinate with and build on that strategy. Projects presented are categorized according to their benefit for the Union spawning aggregation of concern.

11.5.2.1. Existing Projects

Figure 11.7 presents existing summer chum salmon projects in the Union River watershed.

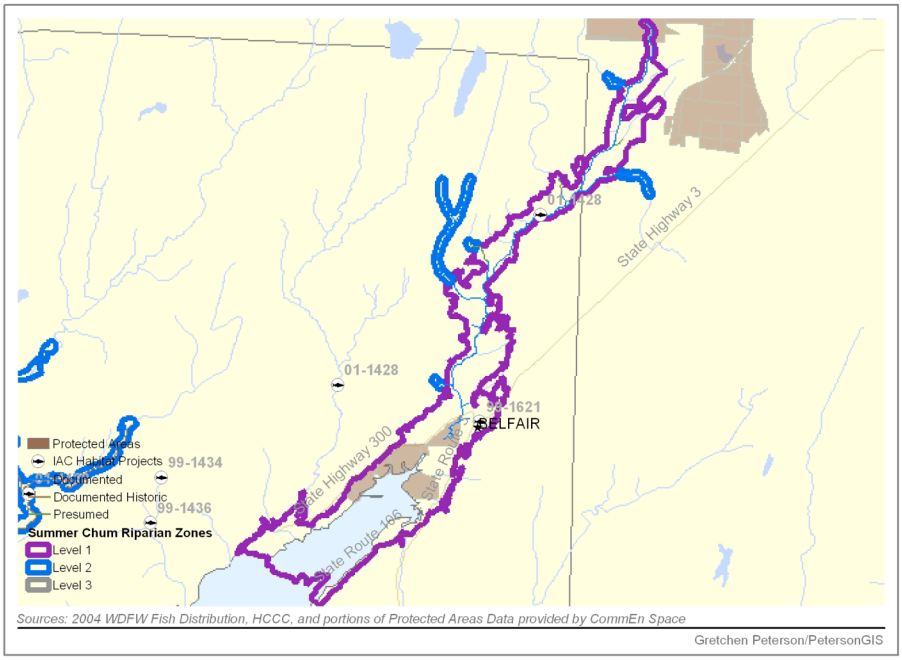

Figure 11.7. Existing summer chum salmon habitat restoration projects in the Union River watershed.

Projects located in the lower Union River watershed that are likely to benefit summer chum salmon are described. The following existing project descriptions are derived from IAC Grant Projects at http://www.iac.wa.gov/maps/default.asp and click on the Grant Project Maps link, accessed on June 12, 2005:

Bear Creek Fish Barrier removal Project 99-1621 Description:
Bear Creek is a tributary to the Union River, which has a low but stable population of summer chum. The culvert under Old Navy Yard Way poses upstream migration problems near the mouth of Bear Creek. The existing culvert is a 71"x 47" culvert with a pipe capacity of 140 CFS at velocities of >15 fps. The culvert has a 30" perch with rock and concrete rubble blocking a 3' plunge pool at the downstream end. The average stream width above and below the culvert is 11 feet, with a 100 year flood flow of 300 CFS. The culvert is undersized, is a velocity barrier during high flows, and is inaccessible to chum due to the perch at the downstream end. Replacing this culvert would open up approximately 0.75 miles of chum habitat and a total of 3.75 miles of good habitat for other salmonids, such as coho and steelhead. In addition, 3 acres of prime wetland habitat can be used by overwintering coho. Local citizens groups are working to rebuild the declining numbers of chinook in the system.

Identify/Restore Limiting Spawning/Rearing Project 01-1428 Description: This project will identify reaches within the Union, Mission, Tahuya, Rendsland, and Dewatto systems where LWD abundance and characteristics, pool surface area and depth is limited. Projects will be completed in areas most beneficial to salmon and that have support from the local communities and landowners. The systems are habitat for summer and fall chum, Chinook, coho, and steelhead.

11.5.2.2. Project Recommendations for the Union Spawning Aggregation

To most effectively address those factors that are likely affecting the performance of the Union spawning aggregation (including the Union and Tahuya watersheds), the SRP recommends the following projects summarized in Table 11.6:

Table 11.6. SRP recommended projects for the Union spawning aggregation.

Union River

Project/Action	Tasks involved, sub-actions, barriers to implementation	Limiting Factors to Address
Remove the dike and tide gates at Belfair State Park	-Perform feasibility study with State Parks, and develop plan to have no net loss of public access	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Restore salt marsh and wetland habitats at the farm on the east bank of the mouth of the Union River	-working with private landowners is critical in a dialogue that can provide a long-term focus	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Monitor borrow ditches and remnant dikes on the salt marsh of Lynch Cove to ensure natural formation of dendritic tidal channels	-will require funding and stable resources to conduct the monitoring and evaluation over the long-term	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Remove fill at Belfair State Park and restore lost salt marsh habitat	-12 acres salt marsh lost to development, with about 3.5 recoverable -will to work with State Parks to determine feasibility and ensure public access that meets Park objectives	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Remove dikes and tide gates at the Klingel Wetlands and fill dike borrow pits	-Project underway with NRCS and Great Peninsula Conservancy -feasibility assessment in process	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)

Remove levees, young alders, and aggraded delta cone on Little Mission Creek to allow more natural sediment routing in estuary	-local groups and state agencies working with Parks to implement early actions	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways) -Riparian degradation -Channel complexity (LWD, channel condition, loss of side channel, channel instability)
Remove fill at Snooze Junction and restore lost salt marsh habitat	-work with private landowner to implement property purchase and restoration	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Remove the private road east of Snooze Junction to restore tidal access to salt marsh west of the road	-work with private landowners (2) to implement skid road-fill removal	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Restore forested riparian buffers at Belfair State Park	-will be implemented when results of feasibility study implemented	-Riparian degradation -Loss of channel complexity (LWD, channel condition, loss of side channel, channel instability)
Remove fill, pool, and infrastructure to the east of the Klingel Wetlands and restore lost salt marsh habitat	-two landowners, currently working with both to proceed with purchase and restoration -possible mitigation project for Northshore road stabilization (Mason County) since fill could also be used for beach nourishment	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Remove the small concrete pool, boat ramp, fill, and bulkhead at Lynch Cove Community Park to restore lost salt marsh	-funded by WDFW -to be implemented 2004 by Hood Canal Community Nearshore Restoration Program	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)

Tahuya River

Project/Action	Tasks involved, sub-actions, barriers to implementation	Limiting Factors to Address
Evaluate the bridge span at the Northshore Road crossing of the Tahuya River for impaired tidal circulation and if necessary construct a longer span to improve tidal flow.	-long term focus to monitor impacts of road on estuary and work with County and PSNERP	-Loss of channel complexity (LWD, channel condition, loss of side channel, channel instability) -Riparian degradation -Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Remove log structures in old log yard on western end of Tahuya bridge	-private landowner (Manke) has given permission to do project -shoreline restoration	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Remove intertidal fill in the vicinity of Caldervin Creek and restore lost mudflat and salt marsh habitats	-full residential development in place -would have to buyout at least one dozen residences	-Estuarine habitat loss and degradation (diking, filling, log storage, road causeways)
Remove the helicopter landing pad on the left bank of the Tahuya River downstream from Northshore Road	-would need to work with private land-owners to determine feasibility	-Channel complexity (LWD, channel condition, loss of side channel, channel instability) -Riparian degradation